

RECLAIMING WATER AND USABLE BRINE CONCENTRATE FROM DOMESTIC SEWAGE

Abstract

5 A method of processing sewage. Non-biodegradable solids are first removed from
the sewage for separate disposal. The sewage is then introduced to the bottom of a
fermentation cell designed to optimize sedimentation and methane fermentation of
10 settleable organic solids, most of which settle in the fermentation cell. Sulfate-reducing
micro-organisms that release sulfides are growing in the fermentation cell. The sulfides
released combine with multivalent metal particles in the sewage to form insoluble particles,
a portion of which settles in the fermentation cell. The remaining metal sulfides, other
15 suspended solids, microorganisms, nutrients, and pathogens in the sewage are then removed
by natural means followed by Dissolved Air Flotation, Slow Sand Filtration and
disinfection. Metal ions that escaped sedimentation in the fermentation cell are adsorbed by
20 microorganisms that have a strong negative surface charge. Finally, reverse osmosis is
carried out to produce purified water and a high-salinity concentrate. The purified water
and the high-salinity concentrate, being substantially free of toxic multivalent metal
particles, can be used respectively for safe human consumption and for cultivation of
halophilic microalgae.

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